

NATURAL HISTORY

By Dr. Stan Hedeon, Xavier University

These are the topics covered in this natural history section.

1. Human Settlement
2. Deciduous Trees
3. Second-Growth Forests
4. Slope and Floodplain Woods
5. Forest Plants
6. Forest Invertebrates
7. Forest Amphibians
8. Forest Reptiles
9. Forest Birds
10. Forest Mammals
11. Grasslands
12. Imported Woody Plants
13. Imported Land Animals
14. Aquatic Communities
15. Stream Invertebrates
16. Stream Vertebrates
17. Fossil Marine Animals

HUMAN SETTLEMENT

On November 18, 1788, a group of pioneers led by Benjamin Stites landed their boats on the Ohio River shoreline directly below Alms Park. They immediately began to clear an opening within the deciduous forest in order to establish Columbia, the first pioneer settlement in today's Cincinnati. The graves of many of Columbia's earliest residents are located in Memorial Pioneer Cemetery, today a park property that also contains an historical marker commemorating the founding of Columbia.

The pioneers buried in the Memorial Pioneer Cemetery certainly were not the first people to occupy Cincinnati. Native Americans already had lived in the area for over 100 centuries. In the 1780s the Shawnee continued to hunt and gather food from the land and streams of Cincinnati, although their villages were then located in the Little and Great Miami River Valleys to the north of the region. Parties of Shawnee reportedly cleared the trees from the Alms Park hilltop in order to keep an eye on the settlement of Columbia.

DECIDUOUS TREES

The pioneers found Cincinnati's land to be entirely covered by a dense forest, portions of which today remain at California Woods, in Ault Park north of the pavilion, and on Pawpaw Ridge in Caldwell Park. Deciduous trees, the dominant plants in the forest, grow throughout Eastern North America because they are well adapted to a temperate climate with hot summers and cold

winters. Their broad leaves produce so much sugar during the summer that the food lasts through the entire year. The deciduous (“leaf-losing”) trees are leafless during the winter in order to prevent the evaporation of water that cannot be replaced when their roots are in frozen soil.

The plants in Eden Park’s Krohn Conservatory make obvious the influence of climate on the composition of a region’s vegetation. The Conservatory’s dry “desert room” supports cacti and other types of plants that would cover Cincinnati’s landscape if local precipitation averaged less than 10 inches per year. If precipitation averaged between 10 and 30 inches per year, Cincinnati would be a natural grassland. However, since its precipitation actually averages about 40 inches per year, the area is dominated by large trees.

If Cincinnati’s climate were warmer, the types of trees in our woodlands would be those seen in the Conservatory’s “tropical rooms.” Tropical trees have broad, green leaves year-around since there is no cold winter weather in the tropics. In contrast, if Cincinnati’s climate was cooler, coniferous trees would cover the land, as is explained below.

Coniferous forests are found in colder places such as Canada where winter is very long. Because coniferous trees there cannot make enough food during the short summer to support them through the entire year, they remain leaf-covered through all twelve months. In order to minimize the evaporation of water that cannot be replaced when their roots are in the frozen winter soil, the evergreen coniferous tree leaves reduce their evaporative surface by being needle-shaped instead of flat and broad. Also, the evergreen leaves are heavily coated with wax to further reduce evaporation.

SECOND-GROWTH FORESTS

By 1900 almost all of the original (or “old-growth”) deciduous woodland in Cincinnati had been cut down. The land had been cleared to establish farms and vineyards, which later were replaced by residential neighborhoods, factory districts, and commercial centers. Deforested areas that were not kept cultivated or mowed soon became covered by juvenile trees. The seeds giving rise to the tree seedlings were brought into the unmaintained fields by wind or animals. Within 25 years of their abandonment, the fields became successional “second-growth” forests. Succession is the name of the process where one plant community (e.g. grassland) is replaced by another (e.g. forest) that is better adapted to the local climate.

Aside from the stands of old-growth forest in California Woods, Ault Park and Caldwell Park, the wooded portions of most Cincinnati’s parks are successional second-growth forests. In some parks, though, the second-growth forests are not the result of natural succession, but are instead the products of human reforestation efforts to stop soil erosion. Mt. Airy Forest, for example, owes its existence to a massive reforestation project undertaken to repair severely damaged farmlands.

SLOPE AND FLOODPLAIN WOODS

The tree species composition in a natural (non-planted) forest varies from one slope to another. Drought-intolerant sugar maples, beeches and basswoods are more common on north- and east-

facing slopes, while drought-tolerant oaks, hickories and ashes are more prominent on south- and west-facing slopes.

South-facing slopes are the driest slopes because they are more directly subjected to the sun's heat. Throughout the year, from mid-morning through mid-afternoon, the sun is located in Cincinnati's southern sky. This fact is illustrated by the Theodore M. Berry International Friendship Park sculpture, "Seven Vessels Ascending and Descending." The tallest vessel is aligned with true south, and so at noon everyday its slit casts a beam of light northward into the center of the Plaza of the Sun.

Although not as dry as south slopes, west slopes are drier than north and east slopes. West slopes are exposed to the prevailing wind and to the afternoon sun that is hotter than the morning sun. In summary, on forested hills and in wooded ravines, south and west slopes are dominated by trees that are better adapted to dryness than are the prevalent trees on north and east slopes.

In the flat floodplains are forests composed of trees that can tolerate frequent flooding, saturated soil, and reduced soil aeration. Bottomland trees include such species as sycamore, cottonwood and silver maple. Floodplain forests are located in Caldwell Park along the Mill Creek, in Magrith Riverlands Preserve and Armleder Little Miami Park along the Little Miami, and in Theodore M. Berry International Friendship Park and Fernbank Park along the Ohio River.

FOREST PLANTS

A forest contains other plants besides tall trees. Beneath the canopy layer of the dominant trees is a subcanopy composed of the crowns of shorter species, e.g. dogwood and ironwood. A third forest layer is composed of shrubs such as spicebush and pawpaw. Groundcover, the fourth and lowest woodland layer, is the domain of non-woody vegetation such as mosses, ferns and herbaceous plants. The subcanopy, shrub and forest floor layers are showiest in spring when their seed plants flower before the forest shade deepens.

Climbing from the forest floor are vines that travel upward into the shrubs and trees. Virginia creeper, wild grape and poison ivy ("leaves of three, let it be") are common in park forests. Also growing on the tree bark may be mosses and lichens. Lichens are plants in which algae (that are green and can make food) live together with fungi (that, in return for food, provide the algae with water and nutrients caught from the air). A forest also contains free-living fungi in the form of mushrooms, puffballs and brackets.

FOREST INVERTEBRATES

Insects comprise the largest group of forest animals. Most of these six-legged invertebrates are winged, but some are wingless, e.g. ants and termites. Insects are found everywhere in the woodland: underground, on and in stems, beneath bark and in foliage. Any forest stand in Cincinnati contains thousands of different insects.

Related to insects are the animals that have more than six legs: spiders, mites, centipedes, millipedes and sowbugs (or pill bugs). Of these, spiders are the most common, with hundreds of

species living in any one woodland. Finally, among the forest invertebrates there are those that have no legs: snails, slugs and worms. These animals rest in moist, protected habitats during the day and venture out to feed at night or during rainstorms.

FOREST AMPHIBIANS

Adult woodland salamanders, frogs and toads prey on worms, snails, sowbugs, spiders and insects. In spring, these amphibians mate and place their eggs in aquatic habitats that will contain sufficient food for their gilled larvae. Following the transformation of the larvae into lung-breathing adults, they leave the breeding sites and settle in moist areas of the forest where they mature into adults, e.g. dispersing tree frogs take up residence in damp holes and crevices on tree trunks.

There are two amphibian species in park forests that do not display the typical life cycle: the ravine and red-backed salamanders. These woodland amphibians are never found in water. Their eggs are laid in soil, and the rudimentary gills of the non-aquatic hatchlings disappear after a few days.

Amphibians have patchy distributions in a forest due to their specific habitat requirements. Pond-breeding species live close to ponds and stream-breeding species live close to waterways. Although the ravine and red-backed salamanders are not limited to areas around water bodies, they are confined to forest areas that become neither arid in dry months nor periodically flooded in wet months.

FOREST REPTILES

Although one is a reptile and the other is an amphibian, a lizard and a salamander share the same shape. However, lizards have a scaly, dry skin and toes with claws, while salamanders are covered with a smooth, moist skin and have clawless toes. The two native lizards in the Cincinnati parks are the five-lined and broad-headed skinks, both found eating insects in the old-growth woods of Caldwell Park and California Woods.

Local species of snakes have lengths ranging from less than a foot to about six feet. The most common of the small species is the ringneck snake that feeds on small salamanders, worms, and any other animals that the snake can subdue and swallow. Aside from its unpleasant smell and its concealment beneath logs and rocks, the ringneck has little protection against predators, and is even eaten by robins.

The largest snake in Cincinnati is the black rat snake. This climbing serpent grows up to six feet long and preys on small mammals, birds and eggs. Two venomous snakes, the copperhead and the timber rattlesnake, were eliminated from the forests of Cincinnati during the nineteenth century.

The box turtle is the only one of the region's turtles that lives in woodlands. Like most turtles it's an omnivorous predator that is well protected against other predators. The front and rear portions of the box turtle's hinged lower shell can be drawn up tightly against its upper shell to "box" out

any threat.

FOREST BIRDS

Birds and mammals are warm-blooded animals, and so they are able to stay active through the cold months. Over four consecutive winters a total of 28 bird species were recorded in the Ault Park old-growth forest. Seven of the species were winter visitors from the north, while the others were year-round residents.

In the spring and fall, the resident birds are temporarily joined by dozens of migratory species (e.g. warblers and flycatchers). The primarily night-flying migrants stop from one to several days in Cincinnati to replenish their fat reserves before continuing their journey. Some birds that arrive in the spring remain to nest in the summer. In Cincinnati forests about half of the nesting species are migrants from the south and about half are permanent residents.

Five species of birds vanished from Cincinnati during the nineteenth century, due to deforestation and hunting. Two of the species, wild turkey and pileated woodpecker, returned to city woodlands during the twentieth century. The raven, formerly quite common in the region, is now reappearing in northeastern Ohio forests and potentially could re-occupy Cincinnati as well. The passenger pigeon and the Carolina parakeet will not be returning, since they are extinct.

FOREST MAMMALS

At the time of pioneer settlement the Cincinnati forest community included the now-vanished bison, elk, porcupine, black bear, cougar, bobcat and gray wolf, in addition to the woodland mammals that still survive in the area. Loss of forest habitat and a growing population of gun-bearing humans caused the disappearance of these seven species. The white-tailed deer and beaver also were eliminated, but returned to the region during the twentieth century.

The white-tailed deer may be even more common today than it was in the years prior to settlement. A greater amount of deer browse is now available in gardens and second-growth forests than was available under the overshadowing canopy of the virgin forest. Furthermore, the absence of bear, cougar and wolf allows the survival of many deer that otherwise would be eaten by the predators.

Beaver, the biggest rodents in the region, may be spotted in the woods along the Mill Creek at Caldwell Park and along the Little Miami River at Magrith Riverlands Preserve and Armleder Little Miami Park. Other woodland members of the rodent order range in size from the ten-pound woodchuck (or groundhog) to species of mice that weigh less than a half-ounce. Rodents are gnawing mammals that use their large incisors to feed on plants, although a few species also consume animals. The gray squirrel, for example, occasionally eats insects, birds and bird eggs, while the chipmunk supplements its plant diet with insects, worms, slugs and snails.

The herbivorous eastern cottontail, like all members of the rabbit order, has gnawing incisors that are similar to those of rodents. In contrast, the pointed teeth of moles and shrews in the insectivore order are adapted to capture and chew insects, worms and other woodland

invertebrates. The flying mammals of the bat order use their sharp teeth and echolocation to capture moths, beetles and other airborne insects.

The opossum's teeth show that it's an omnivorous member of the marsupial order, a group named after the pouch (or marsupium) in which the female carries and nurses her young. Mammals with large canine teeth belong to the carnivore order, a confusing name since the group contains the raccoon and other omnivorous species that eat plants as well as animals. The raccoon is much more common in Cincinnati parks than are other woodland members of its order: gray fox, striped skunk, and least and long-tailed weasels.

GRASSLANDS

Cincinnati parks are not entirely forested, even though all of the city was once woodland. Frequent mowing keeps shrub and tree species from growing on grassy picnic areas and athletic fields. Less frequent cutting of park meadows allows the grasses and other herbaceous vegetation to grow taller. In two parks, California Woods and Armleder Little Miami, meadows have been planted with prairie plants that are not native to Cincinnati but that add beauty and educational value for park visitors.

Even in non-prairie park meadows most of the vegetation is composed of non-native species, plants brought to Cincinnati from other places in America and the world. Most non-native plants, like Canada thistle and curly dock, arrived in Cincinnati as contaminants in bags of seed crops. These agricultural weeds were soon joined by garden escapes such as dame's rocket and dayflower. Other escaped species started as imported food and medicinal plants, e.g. dandelion and chicory.

With the establishment of human-maintained croplands and grasslands, non-native meadow invertebrates and birds colonized Cincinnati. Red fox, coyote and grassland mice also arrived, primarily immigrating to Cincinnati from states west of Ohio.

IMPORTED WOODY PLANTS

Like most grassland plants, almost all coniferous trees in Cincinnati are not native to the city. The single native conifer is the red cedar, a tree that appears in second-growth woods. All other coniferous species were imported from elsewhere and planted in the parks to enhance the beauty of the landscape.

Some deciduous woody plants also have been introduced. For example, the catalpa tree was brought to Cincinnati from southern states because its wood makes excellent fence posts. The ailanthus ("tree-of-heaven") and white mulberry were brought from China to provide food for imported Chinese silkworms. The local silk industry failed, but the Chinese trees have thrived.

Multiflora rose also was brought from Asia in the 1800s to serve as rootstock for ornamental roses and as a new garden flower. Later the shrub was promoted and planted to form living fences, control soil erosion and provide habitat and food for wildlife. Birds and deer that eat the fruit ("hips") disperse the seeds as they defecate, thereby spreading the shrub across the

landscape. The escaped rose today forms impenetrable thorny thickets in the fields and second-growth woods of many of the parks.

Amur honeysuckle was introduced into Cincinnati early in the 1900s. The handsome Asian shrub was imported for ornamental plantings, soil stabilization and wildlife habitat improvement. The honeysuckle proliferated when fruit-eating birds carried the seeds away from the initial shrubs planted in the city. The Amur honeysuckle today is the most common woody plant in Cincinnati.

IMPORTED LAND ANIMALS

Foreign animals have made their way to Cincinnati. Hundreds of non-native insect species have arrived either as hitchhikers on imported materials and plants, or indirectly through migration from other sites of introduction in North America.

The house mouse and the brown rat were brought to the city as stowaways on riverboats in the 1700s. The domestic pigeon of Europe either escaped or was released from captivity by pigeon fanciers in the 1800s. The European house sparrow was introduced to Cincinnati in the 1860s to feed on caterpillars that were eating the city's shade trees. The European starling reached Cincinnati in the 1920s, spreading west from their 1890 introduction in New York City. The original starlings had been released in New York as part of a campaign to introduce into the United States every non-native bird mentioned in the works of Shakespeare.

The European common wall lizard was introduced to Cincinnati (and the United States) in 1951. After capturing about ten lizards in northern Italy, George Rau released them in the backyard of his house bordering Torrence Parkway. From there the species spread outward, and is today found along Torrence Parkway, Victory Parkway, Columbia Parkway, Larz Anderson Park, Alms Park, Ault Park, Armleder Little Miami Park, Memorial Pioneer Cemetery, and Magrith Riverlands Preserve.

AQUATIC COMMUNITIES

Streams flowing through or past Cincinnati parks range in size from little brooks to the broad Ohio River. In a few parks natural streams have been dammed to create artificial ponds and lakes. Other park streams have been combined with sewage flows and buried underground in sewage pipes. The brooks, creeks and rivers that remain unaltered contain a large variety of stream vertebrates and invertebrates.

STREAM VERTEBRATES

Local fishes include herbivores that feed on stream vegetation, carnivores that eat animals, and omnivores that consume both plants and animals. Fish species typically increase in number downstream. Small waterways support few fishes, usually minnows and darters. The greater diversity of habitats in larger streams allows occupation by several additional types of fishes, including a variety of sunfish, bullheads, suckers and bass.

Native fish species have been joined by non-natives such as carp, goldfish and white catfish. The European carp was introduced in 1879 into fishing ponds in the region, but it soon escaped into local watercourses. Overflows from garden ponds in the 1880s carried the Asiatic goldfish into adjacent streams. The American white catfish, a native of East Coast waterways, made its way into area streams in the 1940s following its initial introduction into fishing lakes.

Fish are caught and eaten by bigger fish, as well as by humans, bullfrogs and various reptiles and birds. Among reptiles, the snapping turtle is the largest species of aquatic turtle in the area. The snapper feeds on fish and any other animals it is able to overpower, as well as on aquatic vegetation. The northern water snake, often seen along Lick Run in California Woods, is a two-to three-foot reptile that primarily eats fish.

Among birds, the belted kingfisher nests in streambank burrows and feeds on fish that it catches through aerial dives into waterways such as the Mill Creek and Little Miami River. Other birds for which fish are the main food items are the great blue heron and the black-crowned night heron, two large wading birds that nest in tree rookeries in the Cincinnati region.

STREAM INVERTEBRATES

Along with some fish, there are several snails, insects and crustaceans that function as herbivores on stream vegetation. These invertebrates are collectively known as “grazers,” most of which feed by scraping the algal coating off of underwater rocks. The majority of stream invertebrates, however, obtain their food from plant debris that is carried into the stream by storm runoff from the surrounding land.

Terrestrial plant debris entering the water provides food for microscopic fungi and bacteria that colonize its surfaces. An insect feeding group called the “shredders” likewise feeds on the plant debris, obtaining nutrition from the microbes as well as from the plant tissues. Another consumer group, composed of clams as well as insects, is known as the “filterers.” These animals filter the stream water to obtain the tiny bits of organic matter that largely result from the action of the shredders. The “gatherers,” a feeding group made up of insects, worms and crustaceans, collect particles that settle to the bottom.

The grazers, shredders, filterers and gatherers are in turn eaten by various species of insects, worms, fish, frogs, salamanders, turtles, snakes and birds. In addition to feeding on stream invertebrates, these predators also feed on terrestrial invertebrates that fall or wash into the stream.

Plankton, tiny organisms that swim weakly or just float, appear in the Little Miami and Ohio Rivers. Phytoplankton (“plant plankton”) are microscopic algae that live in sunlit river water. Zooplankton (“animal plankton”) primarily are tiny crustaceans that feed on phytoplankton. Freshwater jellyfish and some clam and insect larvae also belong to the zooplankton community. Plankton-eating fishes include the gizzard shad and the paddlefish, a species that has a long snout shaped like a paddle and a weight that may exceed 20 pounds (184 pounds is the record).

FOSSIL MARINE ANIMALS

Layers of limestone and shale compose the bedrock of Cincinnati. This bedrock, about 450 million years old, started out as layers of bottom sediment in a sea that covered the area during the Ordovician Period. Close examination of a bedrock slab will reveal the fossilized hard parts of many marine animals, including corals, snails and clams.

Slabs of bedrock may be found in the Cincinnati parks that originally contained limestone quarries, e.g. Fairview Park, Inwood Park and the Twin Lakes area of Eden Park. The slabs and smaller pieces of rock are the quarry debris left from the 1800s when limestone was mined and shaped into foundation blocks for local homes. Fossil-bearing Ordovician rocks also may be found in the many stream channels that cut into the bedrock of upland and hillside parks.